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ABSTRACT

The final report of a study to determine the feasibility of retraining displaced aerospace personnel in the Cape Kennedy, Florida, area is presented. Three broad areas were examined: (1) the development of a profile analysis of aerospace and defense related displaced personnel; (2) compilation of health manpower employment opportunity data; (3) identification and definition of necessary educational and training programs. It was found that no drastic manpower shortage in the allied health occupations existed in Florida, and profile analysis of the displaced personnel indicated an insignificant number of technically oriented retraining candidates out of the approximately 16% who expressed interest. Because of their average age, past salary experience, and sheer lack of numbers, it was concluded that the displaced personnel pool did not appear suitable for retraining. Statistical data regarding allied health professions and characteristics of the displaced personnel are presented. Appended material includes the employment questionnaire used in the study, and a list of 18 computer analyses performed on the completed questionnaires. The analysis results and tabulations are not presented. The general statement is made that attempts to define training requirements for new occupations without prior determination of needs can only lead to failure. (LH)

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FINAL REPORT

CONTRACT NIH 72-4059

FEASIBILITY OF RETRAINING DISPLACED AEROSPACE PERSONNEL INTO THE ALLIED AND PUBLIC HEALTH OCCUPATIONS

JUNE 1973

Klaus W. Lindenberg, *Ph.D.*
Principal Investigator

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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Orlando, Florida

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CONTRACT GOALS

In the past ten years a great upsurge in the demand for quality health care has taken place, accompanied by a mounting sense of dissatisfaction with our existing health care and delivery systems. A number of factors are responsible.

The rate of population growth in the United States was at peak values during the last decade and the demand for medical care outstripped health manpower resources throughout the 1960's. Shortages of physicians and nurses, the subject of wide public concern, led to rapidly increased utilization of auxiliary health workers and thus to intensified labor shortages in the supporting health occupations. Health personnel shortages were acute in virtually all phases of the health service industry - hospitals, nursing homes, offices of medical practitioners, medical laboratories, and in many new positions in the public health area. Though the rate of employment growth in the industry was more than three times the average rate for the economy as a whole in the same period, projections indicated that it would continue to outpace the employment rise in most other industries in the decade ahead.

The supply of medical doctors was known to be well below the levels indicated by increased demand and, despite public outcry, the production of M.D.'s did not accelerate appreciably. The time delay between the requesting of medical care and the receiving of medical care increased from year to year. Waiting times of weeks and months became

common in most urban medical and dental practices.

The inability of most people to receive in the home medical treatment brought on greater dissatisfaction and had the effect of depersonalizing the relationship between patient and health professional. The inconvenience and discomfort thereby created was particularly acute for the aged.

The factor which has perhaps provoked the greatest public outcry and governmental concern is the inflationary increase in health care costs over the past decade. Despite the rate of growth of the health care industry as a whole, the rate of increase in costs to the consumer has averaged approximately 14% per year for almost a decade. This is out of all proportion to the overall rate of economic inflation in the same time period. A number of contributing factors are cited by health care administrators to explain this rate of cost increases. Among these the most frequently cited include the cost of new facilities, increased salaries of employees, increasing numbers of employees per patient, high cost of new equipment, particularly computers, automated diagnostic devices, intensive and cardiac care facilities, and a number of others. Whatever the merit of these claims, the public has remained generally unsatisfied with the cost increases it has had to bear.

Although a number of problems have plagued the health care industry over the past decade, first analysis appeared to indicate to the public as well as to government officials that a critical shortage of health manpower existed and was mainly responsible for the ills of the industry and that this shortage would worsen in years to come.

Reliable statistics on medical doctors and dentists were readily available and indicated that insufficient numbers of these professionals would be trained in the future to keep pace with the

demand for their services. Beginning with the Health Professiors Education Assistance Act of 1963, a series of federal laws were passed, culminating in the Health Manpower Training Act of 1971 (1), which President Nixon called the "most comprehensive health manpower legislation in the nation's history."

The health manpower bill not only broadened the programs originating from the 1963 Act, but also authorized the initiation of a series of new programs specifically designed to eliminate the physician shortages throughout the country. These new programs, which include health manpower education initiative awards, physician shortage area scholarships, grants for training in family medicine, physician assistant training funds, and institutional grants to schools which accelerate the production of physicians by implementing three year medical curricula, were intended to supply financial incentives for medical schools to increase the rate of production of health professionals.

Table I presents a breakdown of the major types of programs funded under this act, giving both the congressional authorization and the actual dollars appropriated for fiscal year 1972. Overall, appropriations were approximately 65% of authorizations.

Although not quite as reliable as the statistics regarding the medical and dental professions, the statistics on the nursing professions indicated the same general trend. The Nurse Training Act of 1971 (2), a companion bill of the Comprehensive Health Manpower Education Act of 1971, was enacted into law and constitutes a basis for federal assistance to nursing education through fiscal year 1974. During fiscal year 1972, appropriations were approximately 50% of the more than $200 million authorized.

TYPE OF PROGRAM	AUTHORIZATION (in millions of dollars)	APPROPRIATION (in millions of dollars)
Construction Support	225	142.4
Formula Grants to Health Professions Schools	234	155.2
Special Project Grants & Contracts	118	53
Aid to Schools in Financial Distress	20	20
Health Manpower Education Initiative Awards	45	20
Student Loans	51.75	30
Scholarships	.15	0
Physician Shortage Area Scholarships	2.5	0
Training in Family Medicine	25	5
Training for Health Professions Teaching Personnel	10	1
Computer Technology Health Care Demonstrations Programs	5	3
TOTALS	736.4	429.6

TABLE I Authorizations and Appropriations for Fiscal Year 1972 of the Health Manpower Education Act of 1971. (Major Programs)

Quite naturally, it was inferred that the allied and public health professions were similarly afflicted and again the federal government responded with legislation intended to assure a greater supply of these professionals. The Health Training Improvements Act of 1970 (3) authorized appropriations of $110 million for fiscal year 1972 to be used to increase the nation's supply of allied health professionals. Despite the lack of reliable data, it was felt that the shortage of allied health workers could quickly reach critical proportions. In fiscal 1972, however, only $28.6 million was appropriated under the Act.

Thus, although public and governmental concern ran high, actual dedication of monies to the rectification of manpower problems ran far below ideal levels.

During 1969 and 1970 the first of what was anticipated to be a series of cutbacks in the defense and aerospace industries occurred. Areas most dramatically affected by these cutbacks included several locales in California, the Seattle, Washington area, Boston, Massachusetts, and Cape Kennedy, Florida. In 1970, it was estimated that there were approximately 10,000 unemployed aerospace engineers and scientists in the Cape Kennedy area alone. Great concern was voiced over the personal hardships of so many individuals as well as the immediate loss to society of the services of this highly trained and experienced group of technical manpower. It was quickly realized that if these individuals, with a minimum of retraining, could be placed into positions in which their professional backgrounds would be utilized, the societal benefits could be immense.

Two principal subject areas of national concern emerged as being the most likely for rapid placement of the displaced aerospace professionals, environmental control and the health care industry. A number of environmentally oriented retraining programs were begun, perhaps the most successful of which has been Project RETRO (Regional Environmental Training and Research Organization) carried out by Florida Technological University, Orlando, Florida, acting in consortium with the Brevard Community College, Cocoa, Florida and the Florida Institute of Technology, Melbourne, Florida.

It was the purpose of the present contract to establish the feasibility of undertaking similar retraining programs in the allied and public health fields.

Specifically, the contract called for:

1. The development of a profile analysis of the aerospace and defense related scientists, engineers, and technicians who have been or may be, surplused from the Kennedy Space Center and have the interest and/or background to enter or be retrained to enter a career position in the public or allied health field.

2. The compilation of health manpower employment opportunity data.

3. The identification and definition of educational and training programs necessary to channel this potential source of manpower into allied health or public health occupations.

The remainder of this report will deal with the methods employed, data acquired, and conclusions reached in these three broad areas.

MANPOWER STATISTICS IN THE ALLIED & PUBLIC HEALTH FIELDS

Health manpower data were gathered from a variety of sources including the U. S. Department of Health, Education and Welfare, the U.S. Department of Labor, the American Hospital Association, the Communicable Disease Center, Atlanta, Georgia, the Florida Department of Health & Rehabilitative Services, and various local city and county health departments. Further, personal interviews were conducted with a large number of hospital administrators and medical chiefs of staff throughout the state of Florida, as well as with the individuals in charge of the allied health curricula within the State University System of Florida and its associated junior colleges.

A. NATIONAL ALLIED HEALTH MANPOWER STATISTICS

The scarcity of national data regarding allied health manpower was startling. In April, 1966, a survey conducted for the U. S. Public Health Service by the American Hospital Association (4) amassed detailed information on manpower utilization and needs in hospitals. That survey, covering all hospitals registered by the American Hospital Association, was the first of its kind since 1959. However, the 1966 survey, conducted shortly after the enactment of Medicare, could not reflect the potential impact of Medicare or medicaid on hospital utilization or manpower demand.

The Public Health Service conducted another nationwide

Hospital Manpower Survey three years later in April, 1969. (5) This time the survey was not restricted to hospitals registered by the American Hospital Association, although the latter comprised approximately 90% of all hospitals in the nation in 1969. Since the 1969 data were based on a sample of 998 hospitals randomly selected, while the 1966 data were obtained from a much larger number of institutions (76% of all AHA registered hospitals), some caution must be used in comparing the results of the two surveys.

If one limits oneself to those statistics applying only to AHA registered hospitals in the 1969 survey, some trend information is discernible.

Using the number of budgeted vacant positions, together with non-budgeted vacant positions deemed necessary for optimum patient care, as an indicator of the demand for health personnel, one finds that between 1966 and 1969 such vacancies, and the implied manpower demands, decreased by 58%. Earlier predictions for an increasing demand for health professionals were apparently not correct for this three year period.

The reason for this decline appears to lie in the sharp increase in hospital employment which took place over the three years. Figure 1 reveals that in that period, total professional and technical health personnel increased by 263,000 or about 20%. Nursing personnel showed an increase of 164,400, or about 16%, while all other technical and professional health personnel increased by 100,000 or about 30%. The classification of ward clerks as nursing personnel was not made clear in the 1966 survey questionaire, therefore the last two proportions may be inaccurate.

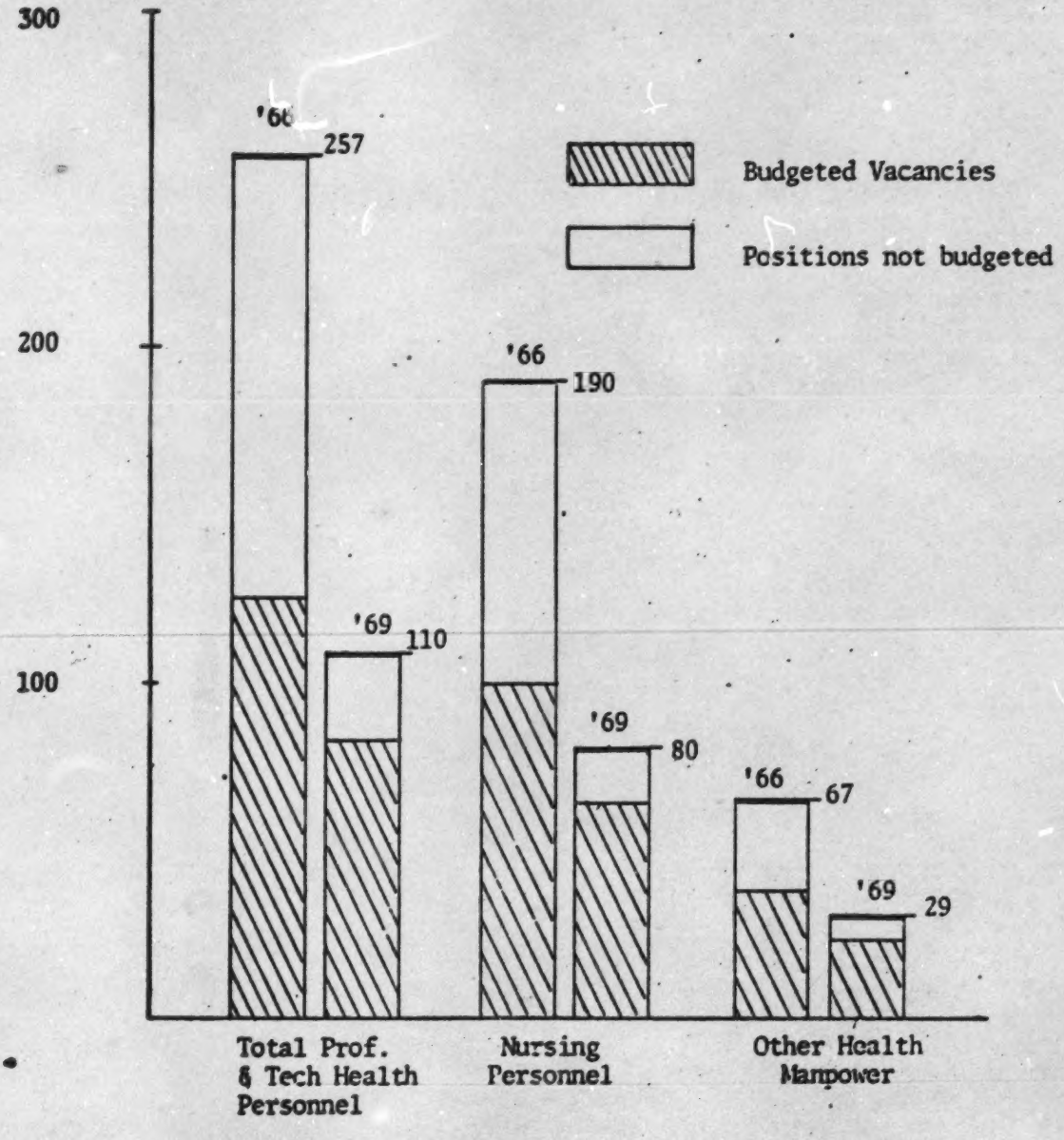

FIGURE 1: Number of additional professional and technical health personnel needed to provide optimum care in AMA registered hospitals (x1000) (Health Manpower in Hospitals)

Figure 2 presents employment data for 1966 and 1969. It is of interest that the overall increase in the level of employment matches very closely the decrease in demand for additional staff, as shown in Figure 1. That is, in 1966 a need for 257,200 additional personnel was voiced. By 1969, 263,000 personnel had been hired, offsetting the earlier need. The remaining additional needs expressed in 1969 probably reflect small increases in patient load and shifts in the patient population produced by Medicare over the three year period.

The 1969 survey revealed that of the total of 1,788,000 budgeted professional and technical positions in hospitals, 93,400 positions, or 5.2% were vacant.

These numbers, however, include a number of health professions to which most displaced aerospace and defense related workers either would not have easy access or to which these workers would generally not find themselves drawn. These professions include:

PHYSICIANS
MEDICAL INTERNS
MEDICAL RESIDENTS
DENTISTS
DENTAL INTERNS
DENTAL RESIDENTS
DIETICIANS
MEDICAL RECORD LIBRARIANS
REGISTERED NURSES
LICENSED PROFESSIONAL NURSES
NURSING AIDES, ORDERLIES & ATTENDENTS
WARD CLERKS
LICENSED PHARMACISTS
SPEECH PATHOLOGISTS & AUDIOLOGISTS

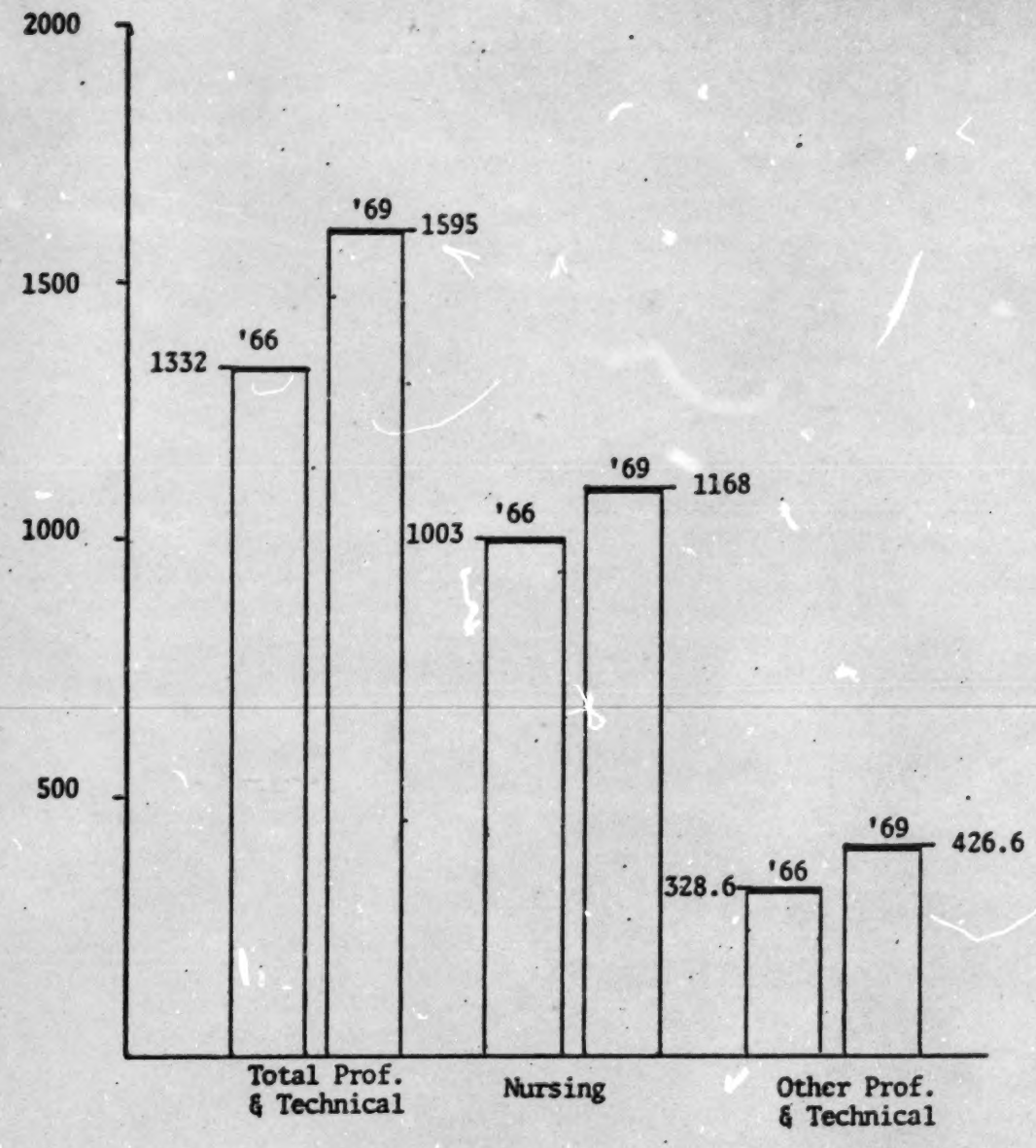

FIGURE 2: Number of professional & technical health personnel employed in AMA registered hospitals. (x1000) (Health Manpower in Hospitals)

When these professions are discounted, one finds that the remaining allied health professions account for approximately 412,000 budgeted positions in the industry. Of these, approximately 17,800 positions were vacant, yielding a 4.3% vacancy rate. The very large drop in overall numbers is caused by excluding the nursing professions, which account for approximately 75% of the professional and technical health manpower totals.

Table II lists the occupations taken into account by the 1969 survey with the exception of the professions above. Total budgeted positions, equivalent full-time employment, budgeted positions vacant, and vacancy percentage are shown for each occupation.

The 1969 Public Health Service survey cited is the most recent national survey of its scope. Since insufficient baseline data exist, it is not possible to identify major manpower trends reliably. It appears, however, that the apparent critical shortage of allied health personnel was alleviated by 1969.

If the efforts of the federal government, cited earlier, to stimulate expansion of educational institutions and programs producing allied health professionals have been successful, the national shortage of these professionals should have been even further reduced in the past three years.

B. STATE OF FLORIDA - ALLIED HEALTH MANPOWER STATISTICS

In 1971 the state of Florida undertook its first major attempt to compile statewide health manpower statistics. The resultant report, Florida's Health Manpower, (6), prepared by the Bureau of Comprehensive Health Planning, Florida Department of Health and Rehabilitative Services,

TABLE II

Category of Personnel	Total Budgeted Positions	Equivalent Full-time Employment	Budgeted Positions Vacant	Percent Vacant
Dental Services:				
Dental hygienists, licensed	600	500	100	16.7
Dental assistants	5,700	5,300	400	7.0
Dental laboratory technicians	1,500	1,400	100	6.7
Clinical Laboratory Services:				
Clinical laboratory scientists	4,300	4,100	200	4.7
Clinical laboratory technologists	42,700	40,400	2,300	5.4
Cytotechnologists-technicians	3,200	3,000	200	6.2
Histologic technicians and aides	5,400	5,200	200	3.7
Other clinical laboratory personnel	39,000	37,800	1,200	3.1
Dietary Services:				
Dietary technicians	17,600	17,200	400	2.3
Medical Record Services:				
Medical Record Technicians	6,900	6,600	300	4.7
Medical Record Clerks	31,700	30,600	1,100	3.5
Pharmacy:				
Pharmacy Assistants & aides	8,900	8,600	300	3.4
Radiologic Technology:				
X-Ray technologists - technicians	30,100	28,800	1,300	4.3
Nuclear medical & radiation therapy technologists-technicians	3,100	2,900	200	6.5
Radiologic Assistants	8,200	8,100	100	1.2

-continued-

TABLE II (continued)

Category of Personnel	Total Budgeted Positions	Equivalent Full-time Employment	Budgeted Positions Vacant	Percent Vacant
Therapeutic Services:				
Occupational therapists	5,700	5,100	600	10.5
Occupational therapy assistants and aides	5,200	5,000	200	3.8
Physical therapists	8,900	7,600	1,300	14.6
Physical therapy assistants and aides	8,300	7,900	400	4.8
Recreation therapists and aides	5,400	5,100	300	5.6
Inhalation therapists and aides	14,600	13,700	900	6.2
Social Workers	15,800	14,600	1,200	7.6
Social work assistants and aides	4,400	4,200	200	4.5
Other Health Professional & Technical:				
Hospital Administrators & assistants	17,500	17,000	500	2.9
Medical Secretaries	23,600	22,800	800	3.4
Surgical Aides	23,300	22,400	900	3.9
Obstetric, pediatric, & other physicians' aides	10,800	10,500	300	2.8
ECG technicians	8,500	8,300	200	2.4
EEG and other medical machine technicians	2,900	2,800	100	3.4
Ambulance drivers and attendants	5,100	5,000	100	2.0
Personnel in other health occupations	21,000	20,300	700	3.3
Trainees not elsewhere reported	22,600	21,700	900	4.0
TOTALS	359,200	360,500	16,900	4.7%

TABLE II: Number & Percent of Budgeted Positions Vacant In Hospitals in the United States in 1969. Equivalent Full Time Personnel Calculated on the Basis of 2 Part-Time Persons Equal 1 Full-Time Person. (from Health Manpower in Hospitals, DHEW, 1970)

revealed the same fundamental situation for the state of Florida as did the 1969 Public Health Service survey for the nation, namely, that no critical health manpower shortage appeared to exist.

In 1972, the same state agency expanded the format of its survey and again published the results, some of which are presented below.

Table III shows a compilation of all budgeted vacant positions in 23 allied and public health occupations as of the last quarter of 1972 for the state of Florida as reported in Florida'a Health Manpower, Vol. II, 1972. (7) The 697 budgeted vacant positions shown represent 4.7% of the 14,989 budgeted positions reported for these occupations, in this document.

The reliability of the individual numbers shown is quite variable, however. For example, since the survey included hospitals, public and private laboratories, and county and state agencies, but not private medical and dental practices, the total number of budgeted positions for dental assistants reported is only 66. This is clearly not an accurate indication of the number of dental assistants operating within the state and one may assume that the reported vacancies are misleading as well. On the other hand, since dental hygienists are licensed by the state, the total of 1140 licensed hygienists reported is probably more accurate reflection of the manpower available, yet the 4 vacancies reported probably do not reflect the true demand for these professionals.

On the average, however, it seems to be indicated that there exists no drastic manpower shortage in the allied health occupations

HEALTH PROFESSION	BUDGETED VACANCIES
Community Health Workers	44
Dental Assistants	11
Dental Hygienists	4
EKG Technicians	18
Engineers	9
Engineer Technicians	9
Health Field Workers	20
Inhalation Therapist	52
Laboratory Aides	2
Laboratory Technicians	14
Medical Records Technicians	24
Medical Technicians	95
Medical Technologists	85
Occupational Therapists	2
Pharmacy Assistants	1
Physical Therapists	26
Physical Therapist Assistants	9
Public Health Physicists	1
Psychiatric Aides	91
Radiology Technicians	59
Sanitarians	52
Sanitary Aides	12
Surgical Technicians	50
X-Ray Technicians	7
TOTAL	697

TABLE III Budgeted Vacancies in 23 Allied Health Professions in the State of Florida, 1972.
(from Florida's Health Manpower, Vol. II, 1972)

within the state of Florida. On the contrary, concern has been voiced by leading state allied health educators that recent expansion of allied health training programs may lead to an oversupply of trained personnel in the near future. (8)

CONCLUSIONS:

In order to estimate the demand for technically competent manpower in the allied and public health professions it would be desirable to know whether the 4% to 5% vacancy rate in these professions is due to a real undersupply of trained personnel or whether there exist other reasons for these vacancies.

In fact a number of related factors are at work within the health care-delivery industry which appear to have significant influence upon the vacancy rate. Perhaps the single most important of these is the fact that positions included in a budget but not filled may not necessarily reflect a manpower shortage. They may instead reflect an under-utilization of personnel already employed who are meeting the "need". Recent trends indicate a shift towards greater utilization of aides and assistants in all the health professions, thus a budget vacancy in physical therapy, for example, may mean that the institution's physical therapy needs are being met by one or more employed physical therapists acting in a supervisory role over a staff of therapy assistants.

Within the state of Florida major shifts in the production of health manpower are also apparent and having effect. These shifts are away from hospitals to educational institutions, but primarily to lower division and vocational-technical centers. At present, 25 of the 28 state community colleges have students in a number of health related curricula, and there are at least 21 preparatory programs in various vocational-technical schools. In addition, a sizeable number

of high schools in the state are directing special attention to the preparation of students for health occupations.

The consensus among some of the leading allied health educators in the state, as well as the Florida Hospital Association, is that if sufficient qualified personnel were available to fill all the budgeted vacancies, only about one third of these vacancies would actually be filled.

Inequitable salary and wage scales in relation to prevailing rates also produce localized "shortages" in some areas.

In addition, a geographical maldistribution of health personnel exists, the larger metropolitan areas enjoying much larger numbers of health professionals per capita than the rural areas.

Both of these problems create a certain number of budgeted vacancies because of the undesirable employment conditions.

Additional factors contributing to the residual vacancy rate are generally low salary scales and quite rigid certification, registration and licensing requirements by professional associations and government. As an example, 52 budgeted vacancies for sanitarians were reported in Florida in 1972. The state of Florida requires that sanitarians possess a bachelor's degree and pass a written state examination. Salaries for sanitarians range from $7,500 to $8,500 in most central Florida counties and since most college graduates in the sciences and engineering can easily find better salaries they are not drawn to the field. Those that are, often find the work tedious and soon leave. To make up for this, county health departments are forced to hire college graduates from totally unrelated disciplines and train them at great expense. Again, these trainees find the work unrewarding

and leave. The result is an extremely high personnel turnover rate and chronic vacancies. Brevard county, in which the Kennedy Space Center is located, reported an 80% turnover of sanitarians in 1972, (9)

Although not as extreme, a similar situation occurs in many other allied health occupations. X-ray technicians, for example, must have 2,400 hours of clinical experience before being fully certified for a not very well paying job. Indeed, most of the standard allied health job classifications require graduation from some form of accredited training program, although many accrediting agencies are not national in scope. (10) The result is an extreme lack of horizontal and vertical job mobility for workers in the health care industry, high personnel turnover rates and chronic vacancies. Best current estimates are that personnel turnover rates in Florida health care institutions may be approaching 50% annually. (11)

One must conclude, therefore, that the allied health occupations will not be highly appealing to potential retraining candidates from the areospace industry.

PROFILE ANALYSIS OF DISPLACED AEROSPACE WORKERS

The survey of unemployed aerospace personnel in the vicinity of the Kennedy Space Center was conducted under the auspices of the American Institute of Aeronautics & Astronautics, Cape Canaveral Section, during 1972 and the first quarter of 1973.

The first half of 1972 saw no massive layoffs of workers. During this time less than 25 aerospace personnel were registered with various employment agencies including the Florida State Employment Services, the MRTB, and all the major technical/professional societies having chapters in Central Florida. These individuals were not surveyed.

Three larger layoffs occurred during the second half of 1972 and early in 1973. A total of slightly over 400 "technical" personnel were let go by three companies servicing the Kennedy Space Center. These individuals were given questionaires at the time of release from their companies and 390 completed or partially completed questionaires were returned for analysis. A sample questionaire is shown in Appendix I.

The accompanying computer printout gives a complete tabulation of all the processable questionaires in alphabetical order by the respondent's last name and a detailed statistical analysis of the responses. Appendix II lists the various analyses performed. The following sections provide brief overview of the responses obtained.

A. PROFILE ANALYSIS OF THE ENTIRE GROUP OF RESPONDENTS

1. AGE - of the 381 respondents giving their ages, the youngest were 21 and the oldest 61 years of age. Mean age of the group was 40 with a standard deviation of 9 years. Figure 3 shows the age distribution for the entire group.

2. EXPERIENCE IN DEFENSE OR AEROSPACE RELATED INDUSTRY - Figure 4 shows the distribution of defense/aerospace experience for the group. The mean of the distribution is 13 years, with standard deviation of 5 years.

3. SALARY - The salary distribution for 327 respondents is given in Figure 5. Mean salary for the group is in the range from $12,000 to $14,000 with a standard deviation of approximately $2,000.

4. EDUCATION - Of 380 respondents approximately 60% had only a high school education while less than 26% held bachelor's or higher degrees. Only 2 doctorates were represented in the entire group. The mean highest level of education is 13.4 years. Figure 6 shows the highest level of education for the entire group.

We feel that the predominance of high school graduates is a significant finding for it reveals that a major fraction of this group is not of engineering or scientific caliber. 32.4% of the group classified themselves as technicians, while 27% classified themselves as engineering personnel. However, in view of the educational distribution and the tendency among aerospace companies to use the term "engineering" rather loosely, the latter figure is probably somewhat high.

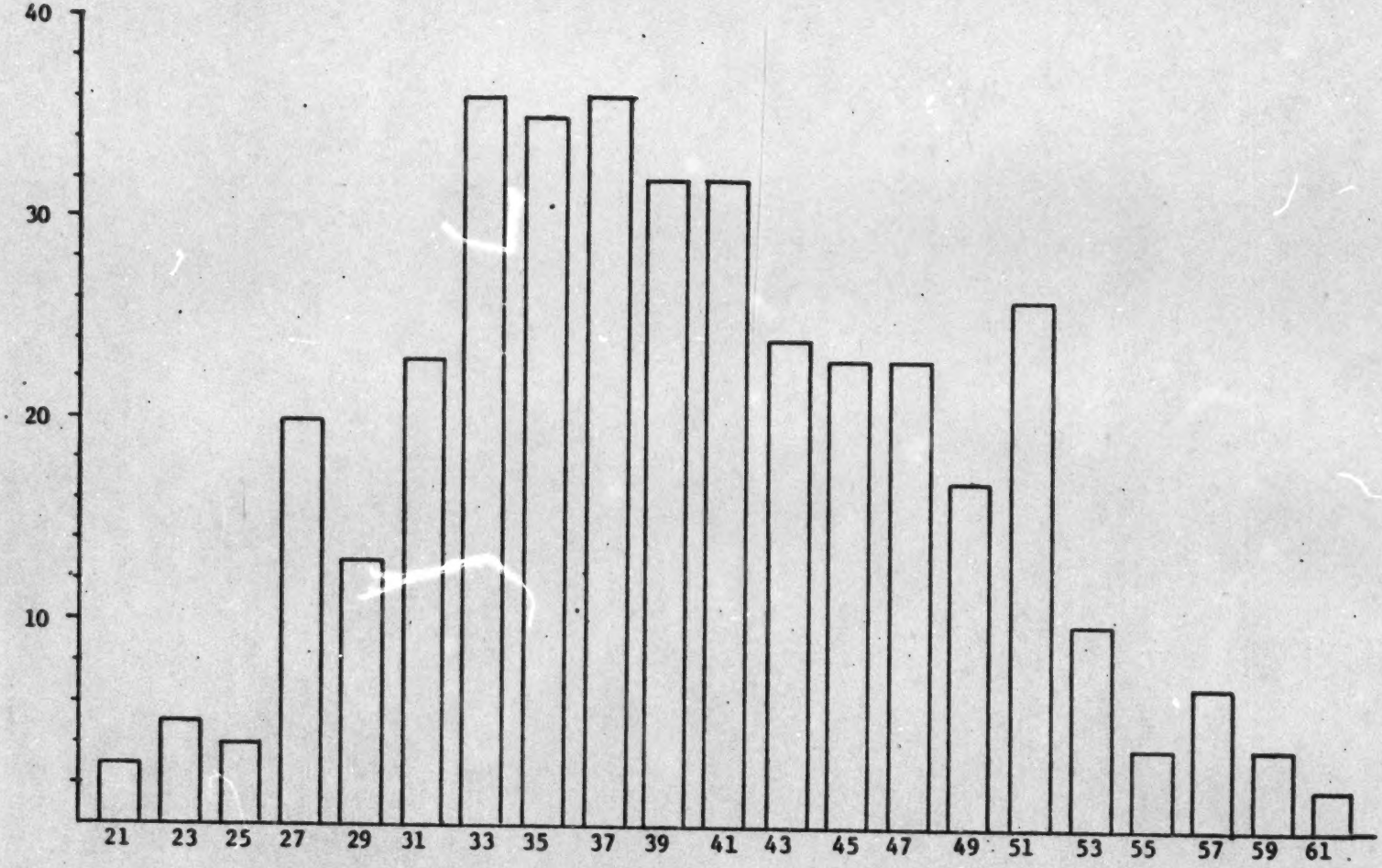

FIGURE 3: Age Distribution of 381 Respondents. Horizontal Scale-Age in 2 year Increments. Vertical Scale - Number of Responses.

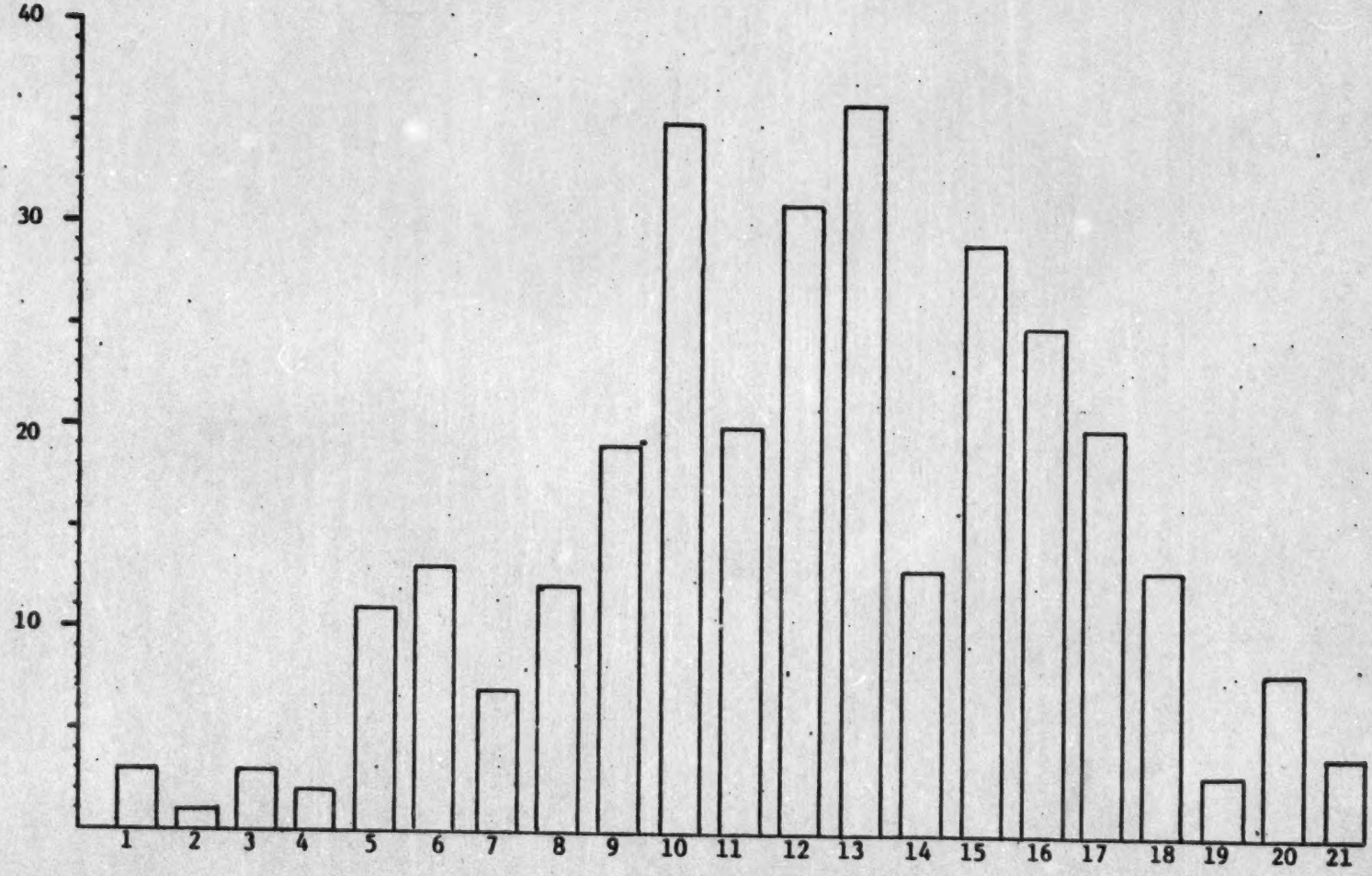

FIGURE 4: Number of Years of Experience in Aerospace/Defense Related Industry of 323 Respondents. Mean of the Distribution is 13 Years.. Horizontal Scale - Years of Experience. Vertical Scale - Number of Responses.

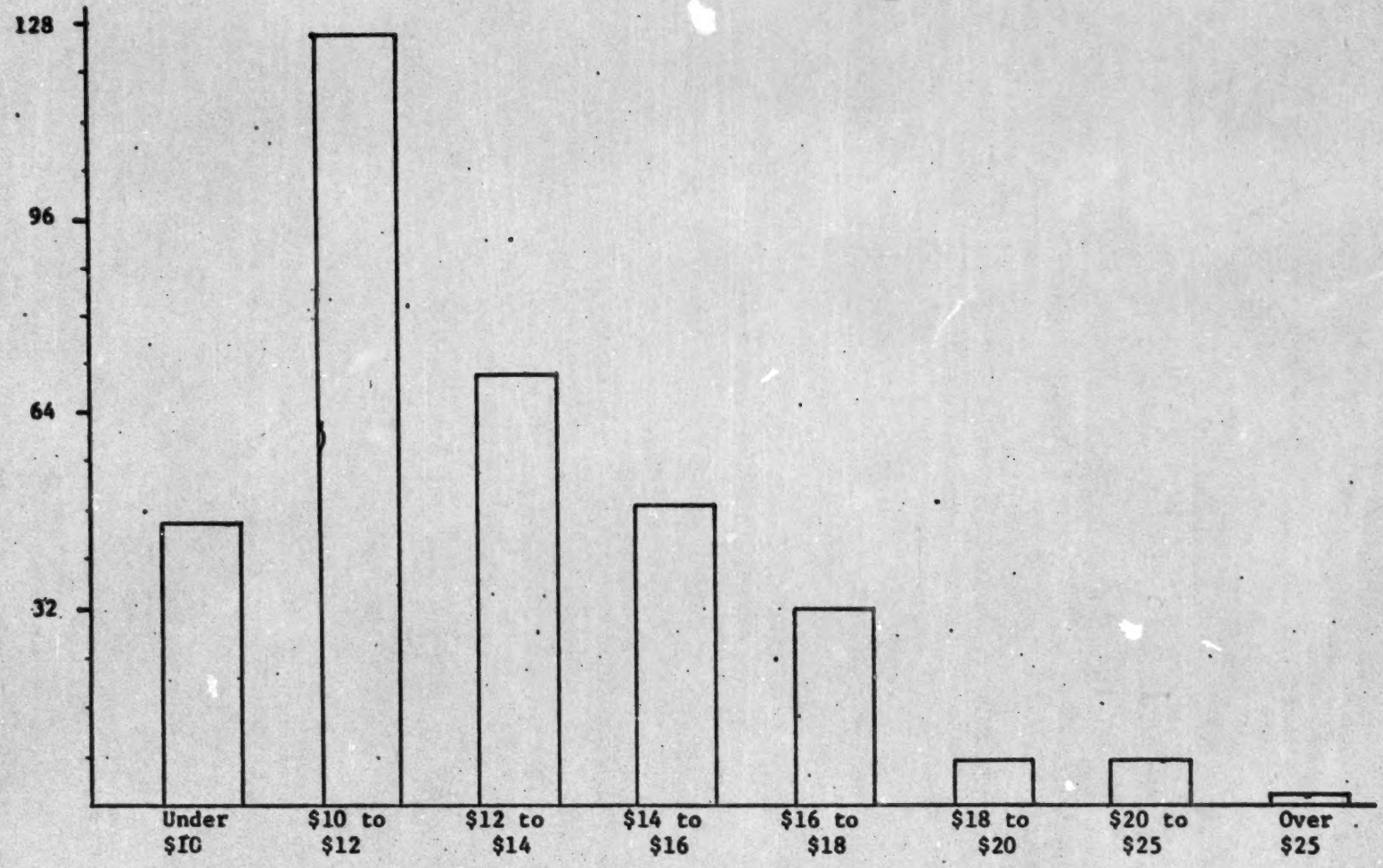

FIGURE 5: Salary Distribution for 327 Respondents In Thousands of Dollars. Mean Salary is $12,000 - $14,000. Vertical Scale - Number of Responses

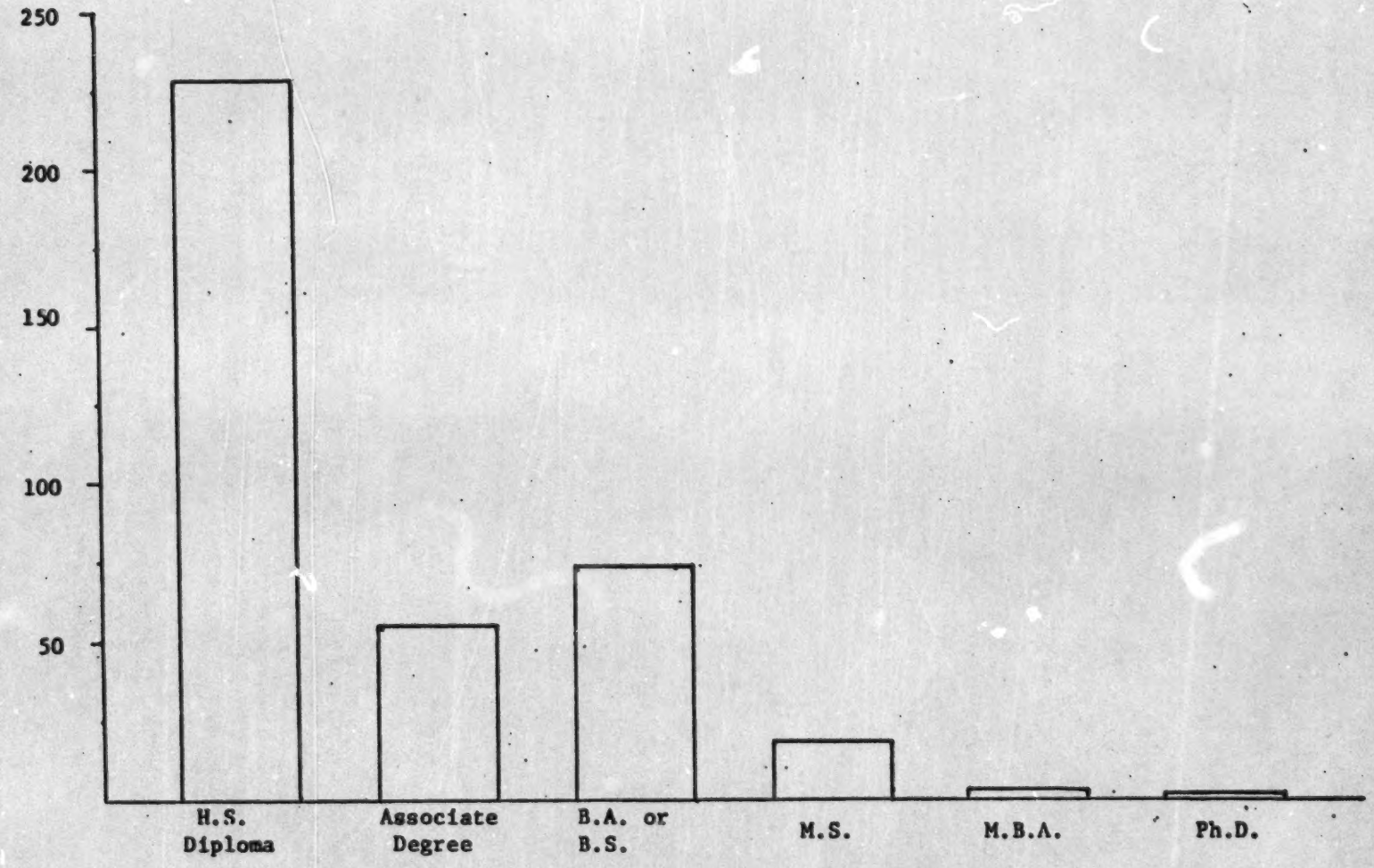

FIGURE 6: Highest Level of Education of 379 Respondents.
Vertical Scale - Number of Responses.

5. FIELDS OF SPECIALIZATION - Respondents were allowed to indicate up to three fields of specialization. More than 64% indicated an Electronics/Electrical/Communications speciality. The next most prevalent specialties were Administration/Staff Support at 16% and Computer/Information Sciences at 14%. Table IV shows the various fields of specialization in order of decreasing number of responses.

6. RETRAINING - 298 individuals indicated an interest in being retrained, 79 indicated that they would not be interested, and 9 did not respond to the question. Figure 7 depicts the relative interest displayed in the retraining areas listed in the questionaire. 59 of those expressing an interest in retraining did not indicate an area of interest.

7. DESIRE TO RELOCATE - The vast majority of respondents expressed the desire to remain in Brevard County, Florida. Only 13% indicated a desire to leave the area.

The above is intended as a quick overview of certain aspects of the profile of the entire group of displaced workers. Additional detail is provided in the accompanying computer printout.

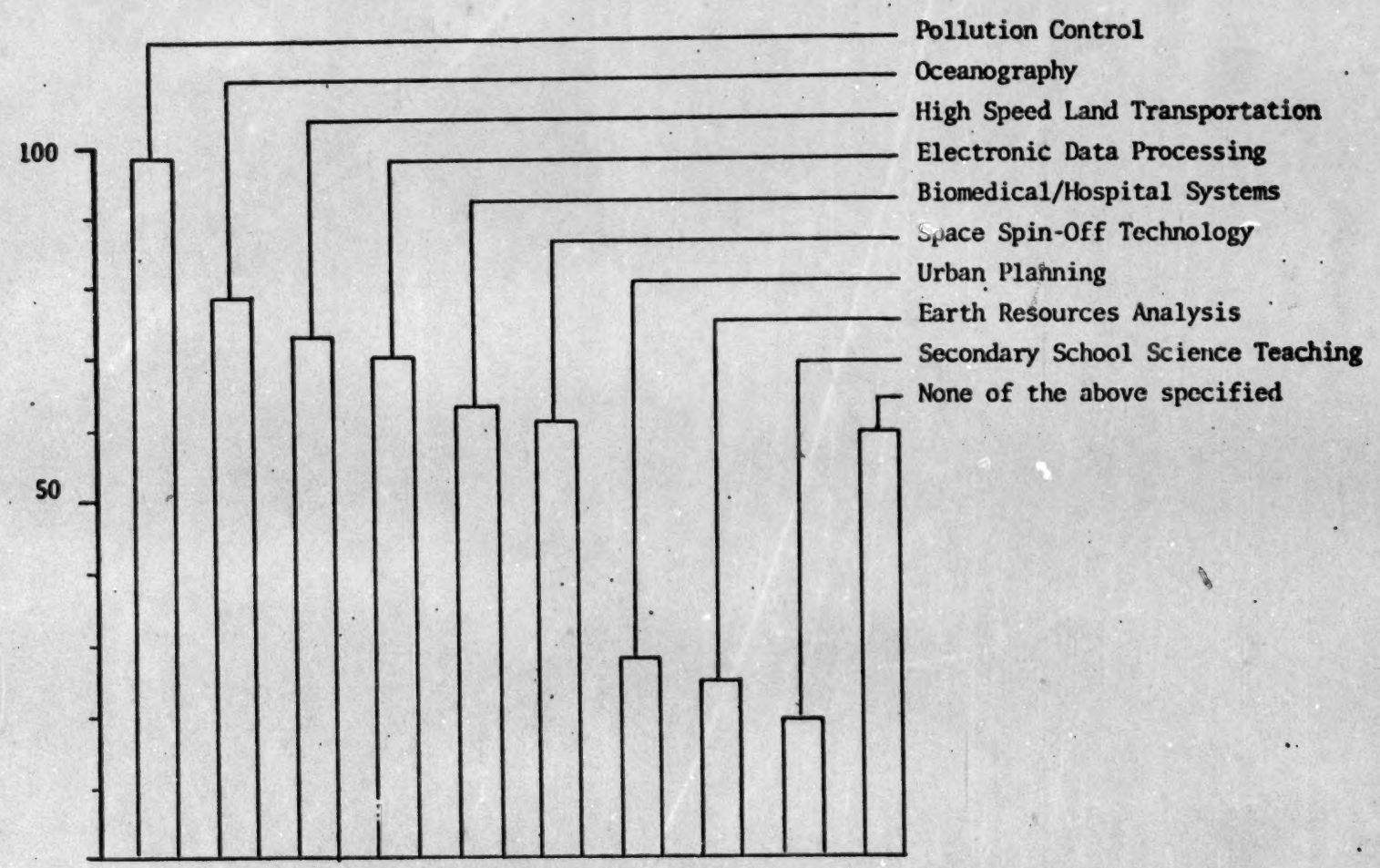

FIGURE 7: Relative popularity of various potential retraining areas. Each respondent was allowed to specify up to two areas.

FIELD OF SPECIALIZATION		NUMBER OF RESPONSES
1.	Electronics/Electrical/Communications	176
2.	Administration/Staff Support	43
3.	Computers/Information Sciences	39
4.	Mathematics/Statistics	22
5.	Flight Operations/Range/Flight Line	21
6.	Finance/Accounting	17
7.	General Engineering/Sciences	16
8.	Marketing/Customer Support	14
9.	Procurement/Material Services	14
10.	Aeronautics/Astronautics	12
11.	Civil/Construction Engineering	12
12.	Mechanical Engineering	11
13.	Product Assurance	11
14.	Industrial/Personnel Relations	9
15.	Graphic Arts/Publishing	7
16.	Ocean/Marine/Naval Engineering	7
17.	Industrial/Manufacturing Engineering	6
18.	Manufacturing/Manufacturing Services	6
19.	Physics	5
20.	Life/Behavioral/Social Sciences	4
21.	Earth/Environmental Sciences	3
22.	Chemistry/Chemical Engineering	1
23.	Nuclear Engineering	1
24	Metallurgy/Ceramics	0
	TOTAL	274

TABLE IV: Fields of specialization of displaced aerospace personnel expressing an interest in retraining programs, ordered in decreasing prevalence.

B. PROFILE ANALYSIS OF THOSE RESPONDENTS EXPRESSING INTEREST IN BIOMEDICAL/HOSPITAL SYSTEMS AS A POTENTIAL RETRAINING AREA.

A total of 64 respondents expressed an interest in the Biomedical/Hospital Systems area. Of these, 2 failed to give their names and a number of others failed to complete various parts of the questionaire.

The group of 62 whose questionaires proved processable was found to be essentially indistinguishable from the rest of the total group of respondents.

1. AGE - As shown in Figure 8, the age distribution had lower and upper limits of 28 and 62 years, respectively, with a mean of 40 years.

2. SALARY - Salaries ranged from below $10,000 for 2 of the respondents up to the range $20,000 to $25,000 for one respondent. Mean salary for the group was approximately $14,000.

3. EDUCATION - Of 63 respondents, 32 held high school diplomas, 9 held associate degrees, 21 held bachelors degrees, and 1 held a Master of Science degree.

The educational level of this subgroup is thus slightly higher than that of the group as a whole, but still less than 50% had gone beyond high school.

Table V lists the group of 62 respondents interested in Biomedical/Hospital Systems by name and according to highest educational level. Column one lists those individuals with high school diplomas only, column two lists those with an associate degree or higher.

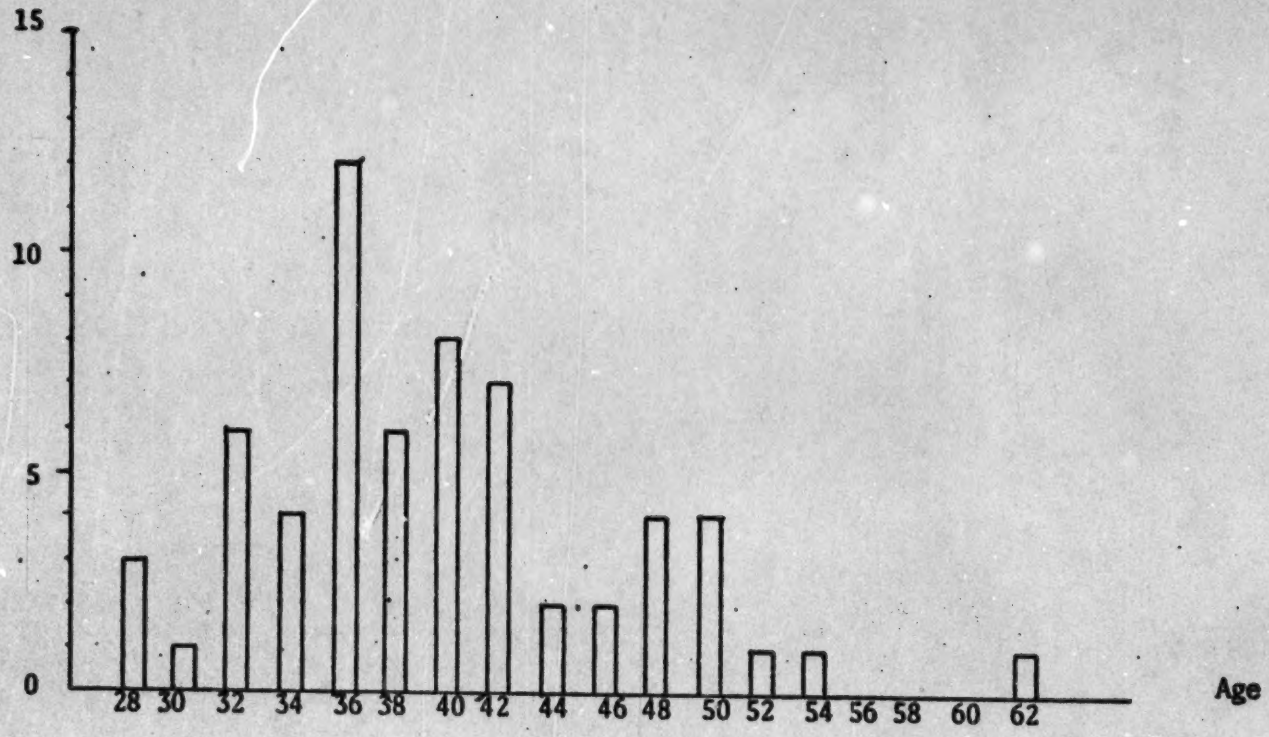

FIGURE 8: Histogram of the Age Distribution of 62 Respondents Expressing An Interest in Biomedical/Hospital Systems Retraining.

QUESTIONNAIRE RESPONSE

INTERESTED IN NEW FIELDS

High School Diploma	AA Degree & Above
Adams, Larry	Acker, Daniel
Anz, Joseph	Aldrich, Wayne
Boe, Luverne	Allen , David
Brown, George	Ambrose, Joseph
Bursey, Benjamin	Baldwin, Jesse
Callesa, Micheline	Benton, Howard
Carlson, Arthur	Bolger, Alfred
Dykema, Leonard	Christophe, Maxwell
Gavora, Donald	Davies, William
Hall, John	Gilliam, William
Hanson, Byron	Graves, Carl
Hutto, Harry	Green, Leonard
Jarvis, Curtis	Grandis, Joseph
Kolaya, Anthony	Halikman, King
Laibl, Charles	Kirchhoff, Robert
Leasure, Roy	Klobe, Donald
Lemmon, William	Maurer, John
McCready, Wilbur	McNeely, Charles
Poag, William	Nichols, Thomas
Poole, Jackie	Peacock, Hugh
Powell, Kossie	Peters, Jack
Price, Francis	Plaisance, James
Pye, Edward	Rawls, Otis
Roberts, Richard	Ray, Edwin
Ryder, Douglas	Rollan, Ervin
Snider, Normal	Singleton, Isaac
Stem, John	Springer, Wesley
Vicari, Robert	STOves, Phillip
Waters, Luther	White, Dorothy
Wey, Gladys	Whitley, Charles
Wyma, Robert	
Yancey, Albert	

TABLE V: Name & Highest Educational Level of the Sixty-Two Respondents Expressing an Interest in Biomedical/Hospital Systems Retraining.

As stated above, this subgroup showed no distinguishing characteristics to differentiate it from the total group on the whole. In an effort to gain more insight into the background and current status of the 30 respondents having at least an associate degree, the attempt was made to contact them individually during the early part of May, 1973.

It was found that of the 30 individuals, 22 were either working or going to school full time, 7 had left the area or were not locatable, and one was unemployed and looking for work. Table VI lists the 30 names and a brief description of their status as of May, 1973.

One is forced to conclude that no significant number of technically trained retraining candidates for allied & public health occupations are available in this area at this time.

Acker, Daniel - working Martin-Marietta, Orlando, Florida
Aldrich, Wayne - working United Telephone Co., Mansfield, Ohio
Allen, David - working Power Service Station, Titusville, Fla.
Ambrose, Joseph - working Brevard County Sheriffs Dept. -
Baldwin, Jesse - not registered with Cocoa FES, unable to locate
Benton, Howard - working RCA, Cape Kennedy, Florida
Bolger, Alfred - phone disconnected, working Cook Electric, Chicago, Illinois
Christophe, Maxwell - moved, phone disconnected
Davies, William - unable to locate, not registered with Cocoa FES
Gilliam, William - unable to locate
Graves, Carl - moved, phone disconnected
Green, Leonard - working Strand and Son Real Estate, Cocoa, Fla.
Grondin, Joseph - attending Florida Technological University, Orlando, M.S. Program
Halikman, King - attending Florida Institute of Technology
Kirchhoff, Robert - unable to locate, not registered with Cocoa FES
Klobe, David - working Advanced Electronics Systems, Cocoa, Fla.
Maurer, John - working Sylvania, Needham, Mass.
McNeely, Charles - working Brevard North Cable TV
Nichols, Thomas - working Radiation, Melbourne, Fla.
Peacock, Hugh - working Federal Electric, Cape Kennedy, Fla.
Peters, Jack - working Radiation, Melbourne, Fla.
Plaisance, James - unemployed, seeking work
Rawls, Otis - working Advanced Electronic Systems, Cocoa, Fla.
Ray, Edwin - working Radiation, Melbourne, Fla.
Rollan, Ervin - working Advanced Electronic Systems, Cocoa, Fla.
Singleton, Isaac - unable to locate, not registered with Cocoa FES
Springer, Wesley - working City of Vero Beach, General Engineering
Stokes, Phillip - working Wyatt and Stokes Air Conditioning, Melbourne, Fla.
White, Dorothy - working General Electric, Bay St. Louis, Mo.
Whitley, Charles - going to Florida Institute of Technology

TABLE VI: Employment Status of the Thirty Respondents From Table V Having At Least An Associate Degree. (May 1973)

CONCLUSIONS AND RECOMMENDATIONS

Two sets of conclusions will be discussed here, those concerning the health care industry as a potential employment market for displaced aerospace/defense personnel and those concerning those personnel themselves, as potential retraining candidates and, ultimately, employees in the health care industry. Recommendations for further action will be based on both sets of conclusions.

As was brought out in the first sections of this report, the anticipated crisis in allied and public health manpower has not materialized. Both national and state statistics indicate that increased hiring rates together with accelerated production of health professionals in the past half decade have not only prevented the crisis from developing but have largely filled the earlier existing manpower needs.

This is not to say that the delivery of health care has approached its optimum levels. It does mean, however, that within the present structure of the health care industry, no major manpower shortages appear to exist in those standard occupational categories comprising the industry structure.

In view of these statistics, together with information gained in private interviews with numerous health care administers, one if forced to conclude that the allied health professions do not represent a desirable retraining objective for displaced aerospace personnel at the present time.

It is inevitable that the health care/delivery system undergo major changes in order to increase the efficiency of its operation and quality of its services. When such changes occur, they will no doubt be accompanied by shifts in insitutional staffing patterns and redefinition of a number of health professions. Greater emphasis will certainly have to be placed on the utilization of technology and the engineering sciences.

However, since neither the time course nor the tenor of such changes can be predicted at present, it is not possible to define technical occupational categories which might ultimately come into some demand.

Turning to the displaced aerospace personnel as potential allied health workers, the report shows first, that only about 16% are interested in being retrained into the health care area, second, that less than half of those interested have had formal technical training beyond high school, and third, those having some advanced technical training had little difficulty finding employment, in many cases within aerospace companies. Of the 390 individuals laid off in the Cape Kennedy area between September, 1972 and February, 1973, there remained one individual in May 1973 who despite possessing more than a high school diploma, might be considered a prospective student for retraining into an allied or public health field.

There are at least two other serious considerations. One, the average age of this group, 40 years, is somewhat high when one considers that many of the allied and public health professions are dominated by younger females, often in positions of authority. Two,

average salaries in the health professions, although difficult to pinpoint, appear to be significantly lower than those enjoyed by aerospace employees. Thus, even if retraining and placement in health occupations were undertaken, it is quite likely that many of the retrainees would quickly leave the health industry in search of higher pay and more desirable working conditions.

We conclude, therefore, that because of their average age, past salary experience, and sheer lack of numbers, the displaced aerospace personnel pool in the Cape Kennedy area does not appear suitable for retraining into allied and public health occupations.

The following recommendations are based on the foregoing:

1. That no retraining programs into the allied and public health professions be undertaken for displaced aerospace personnel in the Cape Kennedy area at the present time. Best information indicates that:

   a. Number of students for such programs would be found insufficient to make the programs cost effective.

   b. Employment opportunities for retrainees in the Central Florida region would be few. Demand for standard health occupations is being met by new graduates from accredited curricula and by new immigrants to the state from other parts of the nation. Demand for nonstandard health occupations is virtually nonexistent.

2. That those aerospace personnel expressing a high degree of interest in and having the desire to enter the allied and public health occupations be encouraged to enroll in existing accredited educational programs and that financial assistance be made available to these individuals while in training.

3. That formal studies be undertaken to determine organizational, operational and administrative procedures and structures whose implementation will raise the efficiency of operation and quality of service of the health care delivery industry. The determination of such procedures and structures will make it possible to define new health occupation categories and their associated training requirements.

Attempts to define training requirements for new occupations without prior determination of needs can only lead to failure.

It must be stressed that the results of this survey may be heavily influenced by the nature of the operations at the Kennedy Space Center and by its geographical location. It is highly likely that the types of workers found at other aerospace centers may have significantly different professional and educational profiles.

The industrial complex surrounding the Kennedy Space Center is geared to provide various services to the Center. It is not primarily a production and manufacturing or research complex. One would thus expect to find a lower proportion of workers possessing scientific and engineering backgrounds than might otherwise be the case. Therefore, extrapolation of profile results given in this report to other geographical areas should be undertaken with care.

APPENDIX 1

AMERICAN INSTUTITE OF AERONAUTICS AND ASTRONAUTICS
CAPE CANAVERAL SECTION
EMPLOYMENT QUESTIONAIRE

NAME ⌊⌊⌊⌊⌊⌊⌊⌊⌊⌊ ⌊⌊⌊⌊⌊⌊⌊⌊⌊⌊ Company: Pan Am___; RCA___; Other___
Last CC1-10 First CC11-20 CC21=P,R, or O

I. PERSONAL

1. What sex are you? Male_____; Female_____.
   22 = M,F
2. What is your age? ⌊⌊ Years old.
   23,24
3. Are you a military veteran? Yes_____; No_____. Discharged after 31 Jan. 1955?
   25=Y,N
   Yes_____; No_____; Disability? ⌊⌊⌊%
   26=Y,N 27, 28, 29
4. Are you an active member in the military reserves? Yes_____; No_____.
   30=Y,N
5. The number of individuals dependent on you for financial support? ⌊⌊ Dependents.
   31,32
6. Currently, is your wife/husband gainfully employed? Yes_____; No_____.
   33=Y,N
7. How long have you been a resident in the Brevard area? ⌊⌊ Years.
   34,35
8. How strongly do you desire to remain in the Brevard County area? _____ Very
   36=V
   _____ Moderately _____ Slightly _____ Wish to Leave.
   36=M 36=S 36=L
9. Are you willing to enter some form of federally subsidized retraining program?
   Yes_____; No_____. A training program not federally subsidized? Yes_____; No_____.
   37=Y,N 38=Y,N
10. If yes, which of the following would you consider for future employment: Select a maximum of two (2) only.

a.	Space Spin-Off Technology	( )	
b.	Pollution Control	( )	
c.	High Speed Land Transportation	( )	
d.	Biomedical/Hospital Systems	( )	
e.	Oceanography	( )	
f.	Earth Resource Analysis	( )	
g.	Secondary School Science Teaching	( )	
h.	Electronic Data Processing; Business	( )	Scientific ( )
i.	Urban Planning	( )	

39,40

II. EDUCATION

1. What is your highest level of education? a._____ High School; b._____ Assoc. Degree;
   41=a 41=b
   c._____ BA or BS; d._____ MS; e._____ MSA; f._____ Phd; g._____ LLB.
   41=c 41=d 41=e 41=f 41=g
2. Are you utilizing your highest level of education in your present position?
   Yes_____; No_____.
   42=Y,N
3. Have you taken any additional educational courses to remain abreast in your specific job technology? Yes_____; No_____.
   43=Y,N
4. Have you received any financial reimbursement for your educational expenditures?
   Yes_____; No_____
   44=Y,N

43

5. If yes, was this money provided through veteran's benefits? Yes____; No____. (43=Y,N)

   a. If no, go to question 6.
   b. If yes, was this company involved in aerospace or defense work? Yes____; No____. (46=Y,N)
   c. Approximately how many course hours did you complete? |_|_|_| (47 48 49) Course hours.

6. If you received financial support, but not through veteran's benefits, was this company involved in aerospace or defense related work? Yes____; No____. (50=Y,N)

   a. Approximately how many course hours did you complete and receive financial support? |_|_|_| (51 52 53) Number of course hours.

III. EXPERIENCE

1. How many years of experience do you have in the defense or aerospace industry? |_|_| (54 55) Years.
2. Have you ever been laid off before by a defense or aerospace company? Yes____; No____. (56=Y,N) No. of occasions |_|_| (57 58).
3. The number of years with your present employer? |_|_| (59 60) Years.
4. Would your present position be classified as a.____ (61=a) Clerical; b.____ (61=b) Secretarial; c.____ (61=c) A Mechanic; d.____ (61=d) A Technician; e.____ (61=e) Engineering; f.____ (61=f) Computer Sciences; g.____ (61=g) Accounting; h.____ (61=h) Supervisory (management) Employee; or o.____ (61=o) Other. If other, please indicate your position. _____
5. What is your major field of specialization?

   (Select Maximum of Three (3) Only)

- A ☐ Administration/Staff Support
- B ☐ Aeronautics/Astronautics
- C ☐ Chemistry/Chemical Engineering
- D ☐ Civil/Architectural/Construction Engineering
- E ☐ Computer/Information Sciences
- F ☐ Earth/Environmental Sciences
- G ☐ Electronics/Electrical/Communications
- H ☐ Finance/Accounting
- I ☐ Flight Operations/Range/Flight Line
- J ☐ General Engineering/Sciences
- K ☐ Graphic Arts/Publishing
- L ☐ Industrial/Manufacturing Engineering
- M ☐ Industrial/Personnel Relations
- N ☐ Life/Behavioral/Social Sciences
- O ☐ Manufacturing/Manufacturing Services
- P ☐ Marketing/Customer Support

CC62, 63, 64

- Q ☐ Mathematics/Statistics
- R ☐ Mechanical Engineering
- S ☐ Metallurgy/Ceramics
- T ☐ Oceanographic/Marine/Naval Engineering
- U ☐ Nuclear Engineering
- V ☐ Physics
- W ☐ Procurement/Material/Services
- X ☐ Procuct Assurance/Reliability

6. What is your current salary range?

____ (65=1) Below $10,000	____ (65=2) $10-11,999	____ (65=3) $12-13,999	____ (65=4) $14-15,999
____ (65=5) $16-17,999	____ (65=6) $18-19,999	____ (65=7) $20-25,000	____ (65=8) Above $25,000

IV ADDITIONAL COMMENTS

1. Prior to this date, have you been actively looking for another employment opportunity? Yes____; No____. (66=Y,N)
2. If yes, how many letters of inquiry have you written in the past six months? |_|_|_| (67 68 69) Inquiries.
3. From these inquiries, how many interviews have you had? |_|_| (70 71) Interviews.
4. How many positions have you been offered and turned down? |_|_| (72 73) Positions.

   Number of positions offered to you in the aerospace or defense industry? |_|_| (74 75) Positions.
5. Please feel free to list your comments on retraining programs, federal or state supported, or the aerospace industry in general on the reverse side.

PLEASE RETURN AS PREVIOUSLY INDICATED OR MAIL TO AIAA, P.O. BOX 55, COCOA BEACH, FLORIDA.

APPENDIX 11

STATISTICAL ANALYSES OF THE AIAA QUESTIONAIRE

The following analyses were performed by computer on the 390 completed questionaires received. The results of all the analyses and tabulations are presented in the accompanying computer printout.

1. Tabulation of all the questionaires. Arranged alphabetically by name of respondent. Twenty-four respondents did not give their names. These questionaire are listed first.

2. Histogram of number of years respondents have lived in Brevard County.

3. Tabulation of respondents' desire to remain in Brevard County.

4. Tabulation of respondents' desire to be retrained: a) under federally subsidized programs and b) under non-federally subsidized programs.

5. Tabulation of relative popularity of nine possible retraining specialities.

6. Tabulation of highest level of education of respondents.

7. Number of respondents who felt they were not using their highest level of education fully.

8. Number of respondents who have taken additional courses beyond their highest formal degree.

9. Histogram of the number of years of experience in aerospace/defense related industry.

10. Histogram of the number of prior layoffs among the respondents.

11. Tabulation of numbers of respondents in various aerospace job classifications.

12. Tabulation of number of respondents having various fields of specialization.

13. Histogram of salaries of respondents.

14. Number of respondents who are actively seeking employment.

15. Number of respondents seeking employment who have had new job offers.

16. In each of the retraining fields indicated by the respondents the following information is given:

a) Histogram of ages of respondents indicating each field,

b) Highest levels of education of respondents indicating each field.

c) Histogram of salary distribution of respondents indicating each field.

d) Tabulation of major field of specialization of respondents indicating each field.

17. Correlation between highest level of education and salary for all the respondents.

18. Correlation between number of years experience in aerospace/defense related industry and salary for all the respondents.

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